Application Serial No: 10/037,808 Attorney Docket No. 79530
In reply to Office Action of 05 May 2004

REMARKS / ARGUMENTS

Claims 1-19 are currently pending in the application. Claims 1-4, 6, 7, 10-13 and 16-19 stand rejected. Claims 5, 8, 9, 14, and 15 are objected to. No claims are allowed.

At the outset, Applicants are pleased to note that the Examiner considers the subject matter of claims 5, 8, 9, 14 and 15 to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The Examiner states that Figures 1 and 2 should be designated by a legend such as -Prior Art—because only that which is old is illustrated.

The Examiner objects to the drawings as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

1. Reference sign "34" directed to the cathode should be changed to "36". The Examiner notes that there appears to be two instances of reference sign "34". From left to right in Figure 3, the leftmost appears to be the cathode while the rightmost appears to be the anode (in view of separator "44" being in contact therewith consistent with page 1 of the specification at lines 3-4).

2. Reference sign "47" is not found in any of the drawings. This feature appears to be drawn to the cathode surface as disclosed in the specification on page 11 line 46.

The Examiner objects to the drawings because Figure 3 appears to show the first surface [37] as being the lateral side surface of the anode and not the surface that is disclosed to be in mutual contact with member [38]. See specification on page 10. The Examiner suggests to revise the "squiggly line" from reference numeral 37 to point to the surface of the anode directly opposite reference numeral 42.

The Examiner states a proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The Examiner rejects claims 11 and 19 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner states that claims 11 and 19 recite the limitation "concentration is in the range of from about 0.001% to about 70%". This limitation is considered indefinite as the units of concentration, e.g. molar, % by weight, % by volume

etc." are not recited in the claim. The Examiner further states that a review of the specification was not found to remedy or give breadth and scope to this limitation.

The Examiner rejects claims 16 under 35 U.S.C. 102(b) as being clearly anticipated by Struthers (ref. A: U.S. Patent No. 4,492,741).

See col. 5 line 12-16 and line 54-58 and col. 6 line 51-59. The claimed "preventing contact between each respective anolyte stream and each respective catholyte stream" is considered shown by the intervening Iconolater or Ion Exchange section [Y].

The Examiner rejects claims 1-4, 6, 10-12, 16, 17 and 19 under U.S.C. 102(b) as being anticipated by Marsh et al (ref C: U.S. Patent No. 5,445,905).

The Examiner states regarding independent claims 1, 15, 16 and dependent claims therefrom as noted, Marsh teaches a semi-fuel cell stack comprising a housing, within which is an anode [12], a porous cathode [14], and an aqueous catholyte and anolyte stream. (col. 4, line 30-35, Figure 1) The Examiner also states the cathode is considered to be comprised of two elements: 1) the cathode body itself, which is preferably nickel, and 2) the electrocatalytic coating material electrocatalytic to H_2O_2 reduction such as platinum, iridium, palladium, or a combination such as Ir and Pd", inter alia.

(col. 4 line 6-8, also applies to dependent claims 2, 3 and 6). The electrocatalytic material is considered to anticipate the claimed "means for preventing migration" of catholyte insofar as the hydrogen peroxide solution H_2O_2, as the catholyte is reduced to hydroxide as it passes through the porous cathode, "[a]ll hydrogen peroxide 18 must pass through porous cathode 14 where it is reduced to hydroxide prior to entering the anodic compartment". (col. 4 line 33-35) The reduction of hydrogen peroxide into hydroxide reads on the claimed "inhibiting the transfer of hydrogen peroxide" (applies to dependent claim 17) and the claimed "preventing contact" between the anolyte stream and the catholyte stream (applies dependent claim 16)

The Examiner states as to dependent claim 10, the anolyte is an NaOH/seawater electrolyte, inter alia. (col. 3 line 59-66)

The Examiner states with respect to dependent claims 11 and 19, to the extent that the scope of this claim may be interpreted by the examiner the H_2O_2 in Marsh et al. is disclosed at a preferred concentration of 0.5 to 1.5 molar which overlaps with applicant's claimed 0.001% to about 70% (when converted to molar and assuming applicant is claiming gram/volume percentages)

The Examiner states with regards to dependent claim 12, the anode is formed of aluminum, inter alia. (col. 3 line 44 et seq.)

The Examiner rejects claim 4 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Marsh et al as applied to claims 1-4, 6, 10-12, 16, 17 and 19.

The Examiner states regarding dependent claim 4, the claimed "material impregnated into said porous cathode" has not been given patentable weight as the impregnation step does not give breadth or structural scope to the porous cathode, to this extent, the catalyst material coating the nickel cathode body appears to be the same or similar to the prior art product insofar as the prior art's porous cathode structure similarly functions as a means for migration prevention of the catholyte therethrough. The Examiner also states any differences that may be shown between a nickel/platinum coated cathode and one that has material impregnated would have been obvious to the skilled artisan as a routine modification of the product absent of a showing of unexpected results. In re Thorpe, 227 USPQ 964 (Fed. Cir. 1985).

The Examiner rejects claim 7 under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4,

6, 10-12, 16, 17 and 19 above in view of Pellegri et al (U. S. Patent No. 6,475,661 B1)

The Examiner states Marsh et al. does not explicitly teach a carbon fiber matrix. However, Pellegri et al. teaches a carbon fiber matrix as part of the electrode structure. (col 11 line 60 et seq.) The skilled artisan would find obvious to modify Marsh et al. by employing a carbon fiber matrix for reasons such as providing for a sufficiently larger active area. (Pellegri et al., col 12, line 1-3)

The Examiner rejects claim 13 under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 in view of Medeiros et al (ref D: U.S. Patent No. 6,228,527 B1).

The Examiner states Marsh et al. does not explicitly teach an aqueous sodium hypoclorite solution for the catholyte. However, the skilled artisan would find obvious to substitute sodium hypoclorite for hydrogen peroxide in view of Medeiros et al's teaching that these catholytes are well-known art-recognized equivalents. (col 1 line 34-48)

The Examiner rejects claim 18 under 35 U.S.C. 103(a) as being unpatentable over Marsh et al. as applied to claims 1-4, 6, 10-12, 16, 17 and 19 in view of Hashimoto et al. (ref B: U. S. Patent No. 4,614,693)

The Examiner states Marsh et al. does not explicitly teach a hydraulic pressure greater for the catholyte greater than the anolyte. However, Hashimoto et al. teaches a similar pressure differential arrangement for a redox flow battery in which "the electrolyte pressure in the positive electrode chambers is higher than that of the negative electrode chambers". (col. 3 line 30-41) Thus, the skilled artisan would find obvious to employ a hydraulic pressure greater for the catholyte greater than the anolyte in order to enhance utilization of the electrolyte. (Hashimoto et al., ib)

The Examiner objects to claims 5, 8, 9, 14 and 15 as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The Examiner states regarding claim 5, the prior art of record and to the Examiner's knowledge do not teach or make obvious a migration preventing means comprising a membrane. The Examiner further states the closest prior art teachings shown by Marsh et al. teaches an electrocatalytic coating on a porous cathode body.

The Examiner states regarding claims 8, 9 and 14, the prior art of record and to the examiner's knowledge do not teach or make obvious a plurality of flow channels or means for creating

a plurality of flow channels for the catholyte attached to the anode. The Examiner notes that Figure 3 illustrates the flow channels [40] as being attached to the anode on its other side. The Examiner also states that while Marsh et al. may be interpreted to teach a plurality of flow channels [30] and [32], these channels are not disclosed as being attached to the anode [12]. Instead these channels are disclosed as being as "spacers" which are "held in a fixture" and readily appreciated to be distantly apart from both the cathode and anode. (col. 4 line 45-50)

These rejections and objections are respectfully traversed in view of these amendments and remarks.

Applicants have canceled claims 11 and 19. Applicants have amended claim 1 such that the content of claim 1 now contains the subject matter of claim 5 rewritten in independent form including all of the limitations of the base claim and any intervening claims in strict compliance with the requirements of the Examiner. Having done this, Applicants have canceled claim 5. Applicants have amended claims 2, 3, and 4 to correspond and depend logically from currently amended claim 1. Applicants respectfully suggest that, in light of the amendment to claim 1, claim 1 should now be allowed. Applicants also suggest that claims 2-6 and 7-10 are now also allowable through dependency.

With regard to Examiner's rejection of claim 16, Applicants have amended claim 16 to specifically state that the migration preventing means comprises a membrane. Applicants have done so in light of Examiner's statement that "the prior art of record and to the Examiner's knowledge do not teach or make obvious a migration preventing means comprising a membrane." Applicants have amended claim 17 such that it logically depends from claim 16. Applicants respectfully suggest that, in light of the amendment to claim 16, claim 16 should now be allowed. Applicants also suggest that claims 17 and 18 are now also allowable through dependency.

In order to address the Examiner's objections to the drawings as stated in the Office Action, paragraph 2, Applicants have amended Fig. 1 and Fig. 2 such that they are designated by the legend "Prior Art" in strict compliance with the requirements of the Examiner. Applicants have amended Fig. 3 so that the reference sign "34" directed to the cathode is changed to "36", and so that reference numeral 47 now points to "a surface of the respective cathode", and so that reference numeral 37 points to the surface of the anode directly opposite reference numeral 42.

No new matter has been entered into the application by these amendments.

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The Examiner is invited to telephone Jean-Paul A. Nasser, Attorney for Applicants, at 401-832-4736 if, in the opinion of the Examiner, such a telephone call would serve to expedite the prosecution of the subject patent application.

Respectfully submitted,
ERIC G. DOW ET AL

5 August 2004

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